


EXECUTIVE SUMMARY

2011

SOUTH FLORIDA
ENVIRONMENTAL
REPORT

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The State of Florida and the South Florida Water Management District continue to demonstrate a longstanding commitment to Everglades restoration through the funding, support, and implementation of a myriad of initiatives that benefit the interconnected South Florida ecosystem. Progress was achieved this year on many fronts, including several project construction groundbreakings.

Water quality improvements remain a top priority. Success requires a systemwide, integrated planning and design effort that simultaneously addresses source controls, storage, and treatment. The District's 45,000 acres of Stormwater Treatment Areas treated more than 1.4 million acre-feet of water last year and cut nutrient loads to the Everglades Protection Area by more than 76 percent. During the past decade, these constructed wetlands and improved farming practices have together prevented more than 3,500 metric tons of total phosphorus from entering the Everglades. An additional 11,500 acres of treatment area are nearing completion.

Commitment to restore the *River of Grass* included a 26,800-acre acquisition this year, placing 42 square miles of agricultural land into public ownership. These strategically located lands will be used for the construction of water quality improvement projects that will bring meaningful environmental benefits to the ecosystem.

Lake Okeechobee's ecological health is the best in years. Clear water and flourishing aquatic plants are providing a nursery for fish and other animals, while submerged aquatic vegetation coverage surpassed the lake's target goal. These conditions also enhance recreational opportunities such as fishing that support the regional economy. North of the lake, five hybrid wetland treatment technology sites are being operated and managed for phosphorus load reductions. Also in the Northern Everglades watershed, dispersed water storage on private, public, and tribal lands has been expanded to almost 130,000 acre-feet.

Each year, our agencies learn more about how to scientifically advance our restoration strategies. Through economic challenges and weather-related impacts, we continue delivering results and remain ambitious in our efforts to improve South Florida's ecosystems.



Herschel T. Vinyard, Jr.
Secretary
Florida Department of
Environmental Protection



Carol Ann Wehle
Executive Director
South Florida Water
Management District



2011 SOUTH FLORIDA

Foreword

The 2011 *South Florida Environmental Report* (SFER) marks the 13th year of consolidated reporting by the South Florida Water Management District (District) and the Florida Department of Environmental Protection, pursuant to Chapter 2005-36, Laws of Florida, and Subsection 373.036(7), Florida Statutes. This year's SFER is a comprehensive, three-volume publication, complemented by this Executive Summary, which focuses on major updates and accomplishments over the reporting year. The report distinctly serves the public and decision makers with thorough, up-to-date information on the many advances toward South Florida's environmental restoration and other key activities.

Volume I, The South Florida Environment, documents relevant scientific and engineering efforts throughout South Florida, spanning diverse areas of the interconnected Northern and Southern Everglades systems. This volume satisfies the annual reporting mandates required by dozens of federal and state regulations and permits. A new addition to this year's SFER, *Volume III, Annual Permit Reports*, expands on Volume I to further streamline unified reporting and comply with various permit-related reporting requirements in support of the Comprehensive Everglades Restoration Plan Regulation Act, Everglades Forever Act, Northern Everglades and Estuaries Protection Program, and Environmental Resource Permitting projects and Emergency Orders.

Volume II, District Annual Plans and Reports, comprises eight annual plans and reports required of all of Florida's water management districts. This volume captures the South Florida Water Management District's milestones in implementing the many programs and projects outlined in the agency's Strategic Plan. Now in its seventh year, a web-accessible, consolidated database is also included to efficiently provide additional project-related information.

The entire 2011 report is available on the District's website (www.sfwmd.gov/sfer) and on the compact disc inside the back cover of this booklet. Overall, the far-reaching efforts featured in the SFER provide the scientific foundation of agency programs and projects that ultimately support prudent environmental decision making. With the ongoing support of stakeholders and the public, the 2011 *South Florida Environmental Report* proudly showcases sound management and progress toward restoration of the entire South Florida region.

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VOLUME I

The South Florida Environment

The *2011 South Florida Environmental Report* (SFER) unifies dozens of agency reports into a single document consisting of a three-volume main report and Executive Summary. This consolidated reporting supports the restoration, management, and protection activities associated with the Kissimmee Basin, Lake Okeechobee, the Everglades, and South Florida's coastal ecosystems. Complex regional issues of water quality, quantity, timing, and distribution must be addressed upstream to effectively improve the health of downstream systems. As such, the region is divided into the Northern and Southern Everglades based on delineated watershed boundaries (see map on p. 4). The Northern Everglades includes the Kissimmee area lakes and rivers, Lake Okeechobee, and the Caloosahatchee and St. Lucie rivers and estuaries. The Southern Everglades covers the Water Conservation Areas, Big Cypress National Preserve, Everglades National Park/Florida Bay, and the coastal bays and estuaries south of Lake Okeechobee. This systemwide perspective helps integrate the agency's many regional programs and projects in achieving the restoration goals of the entire Everglades.

Volume I provides status updates and data summaries for various monitoring and research projects associated with South Florida ecosystems during Water Year 2010 (WY2010) (May 1, 2009–April 30, 2010). In 14 chapters, the Volume I framework is similar to the reporting in previous SFERs. Following the Chapter 1 introduction, Chapter 2 presents detailed information on regional hydrology in support of subsequent chapters. Chapters 3 through 5 focus primarily on water quality information linked to Everglades restoration efforts, while Chapters 6 through 12 cover more diverse topics critical to the restoration and management of South Florida ecosystems. Financial reporting on Fiscal Year 2010 (FY2010) (October 1, 2009–September 30, 2010) for the Comprehensive Everglades Restoration Plan, Lake Okeechobee, and Everglades Forever Act (Chapters 7, 10, and 13, respectively) is also included. Dozens of related appendices provide supporting data and more detailed analyses for the special-interest reader and to fulfill several permit requirements.

Hydrology of the South Florida Environment

In South Florida's complex water management system, excess water is stored in lakes, detention ponds, wetlands, impoundments, and aquifers, or is discharged to the coast through estuaries. Hydrologic extremes are exemplified by flooding and excess water during wet years, and wildfires and water shortage during drought years. Region-wide water management is accomplished by the District's operation and maintenance of more than 2,600 miles of canals and levees, about 1,200 water control structures, and 60 pump stations.

Hydrology, the subject of Volume I, Chapter 2, forms the foundation for restoration science and results throughout the report. Water Year 2010 (WY2010) hydrology, including rainfall, water levels, inflows, and outflows for all the major components of the South Florida regional water management system, is presented and compared with the previous water year (WY2009) and historical conditions. In addition, the chapter examines the impacts of the 2009–2010 El Niño event on local weather patterns.

Above-Average Rainfall in Water Year 2010

South Florida's rainfall was above average in WY2010, with much of the precipitation occurring during the annual dry season at the northern end of the region. Although atypical in timing, the wet weather broke the three-year drought streak. This weather phenomenon was due to the 2009–2010

El Niño event. Overall, there was 8.7 inches more rainfall District-wide than the historical average, contrasting with the WY2009 deficit of 7.5 inches, the WY2008 rainfall deficit of 3.8 inches, and the WY2007 deficit of 12 inches. Of the rainfall areas, the Upper Kissimmee was the wettest with 19.9 inches more rain than usual, followed by Broward, the West Everglades Agricultural Area, and Water Conservation Areas 1 and 2. The Upper Kissimmee Basin had outflows of 1.3 million acre-feet (ac-ft), which was nearly triple the 494,638 ac-ft observed in WY2009.

During WY2010, flood management activities were initiated early in the year and endured as the prevailing water management mode. Typically during wet seasons, operations are performed under a flood control mode, and during dry seasons, operations are made under a water supply mode. However, because of excess dry season rainfall, in addition to water supply deliveries for environmental, agricultural, and control of saltwater intrusion, the removal of excess runoff was needed consistently throughout the year.

Regional El Niño Effects Examined

El Niño is a global climate index that indicates a lower atmospheric pressure in the eastern Pacific Ocean because of a higher ocean surface temperature. When the phenomenon is present (about every two to seven years), rainfall usually





increases in South Florida during the dry season. Using such indices to predict the quantity and timeliness of rainfall and related runoff is an important water management tool to mitigate droughts and floods.

In a retrospective study, Lake Okeechobee's water levels during South Florida's annual dry season were shown to spike in correspondence to El Niño years, mostly due to rainfall runoff from northerly basins. Consistent with the historical results, WY2010's lake stages demonstrated that El Niño-related rainfall from December 2009 through April 2010 maintained higher lake levels than normal for the dry months, even with water management operations. For WY2010, the

Regional Inflows and Outflows

WATER FLOW (ACRE-FEET IN THOUSANDS)

Water Year
2010* 2009

1. Lake Kissimmee Outflows	1,308	495
2. Lake Istokpoga Outflows	180	289
3. Lake Okeechobee Inflows	2,400	2,091
4. Lake Okeechobee Outflows	554	1,141
5. St. Lucie Canal Inflows	76	173
6. St. Lucie Canal Outflows	131	165
7. Caloosahatchee Inflows	199	376
8. Caloosahatchee Outflows	1,087	1,016
9. Water Conservation Area 1 Inflows	310	336
10. Water Conservation Area 1 Outflows	521	335
11. Water Conservation Area 2 Inflows	1,299	906
12. Water Conservation Area 2 Outflows	884	737
13. Water Conservation Area 3 Inflows	1,471	1,212
14. Water Conservation Area 3 Outflows	1,137	1,556
15. Everglades National Park Inflows	1,356	1,393

* Water Year 2010 flows are reflected on map.

runoff from El Niño-related fronts and other rains in summer 2009 also replenished surface and subsurface storage, ending drought conditions that persisted from WY2006–WY2009.

Lake Okeechobee Levels Increase

In concert with upstream runoff effects, above-average rainfall in the immediate Lake Okeechobee area in May, June, and July 2009 caused lake stages to rise, reaching a peak of 14.56 feet National Geodetic Vertical Datum on September 29, 2009. As shown in the table, inflows for WY2010 were 2.4 million ac-ft, slightly higher than that of WY2009, and outflows were 554,229 ac-ft, about half the outflows of the previous year released in accordance with the Lake Okeechobee regulation schedule implemented in WY2009. As lake levels increased, the amount of water needed for water supply and storage increased for the entire South Florida region, and it kept up with demand. Water conservation measures, such as restricted lawn watering, remained in place as a core strategy of proactive water management.

Status of Water Quality in the Everglades Protection Area

In Volume I, Chapter 3A fulfills the reporting requirements of the Everglades Forever Act by providing an update on the status of water quality in the Everglades Protection Area (EPA). During WY2010, water quality generally met the state Class III water quality criteria specified in Chapter 62-302, Florida Administrative Code. This chapter also presents an update on nutrients in surface waters in the EPA, including a comparison of total phosphorus (TP) levels to the phosphorus criterion, and evaluates potential factors affecting water quality in this region.

Water Quality Monitoring Results

In WY2010, the parameters evaluated include 62 pesticides and 11 other water quality constituents. Similar to WY2009 monitoring results, excursions were identified in WY2010 for dissolved oxygen, alkalinity, pH, specific conductance, and un-ionized ammonia; however, these excursions were limited to specific areas of the EPA. Additionally, 10 pesticides or their breakdown products were detected at levels above Method Detection Limits within the EPA during WY2010, but only atrazine concentrations in the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) and Water Conservation Area (WCA) 2 exceeded its toxicity-based guideline concentration. All other parameters were below their respective state water quality criteria in WY2010.

Surface Water Nutrient Trends

During WY2010, surface water TP loads to the EPA totaled approximately 85 metric tons, a 31 percent increase compared

to the 65 metric tons in WY2009. Much of the increase in TP loads resulted from greater flow volumes in WY2010 compared to WY2009. Surface water flow to the EPA in WY2010 totaled 2.4 million ac-ft, which is approximately 18 percent higher than the roughly 2 million ac-ft recorded the previous year. WY2010 inflows to the Refuge had the highest TP concentrations, with levels decreasing to a minimum in the inflows to Everglades National Park (Park).

WY2010 geometric mean TP concentrations at interior sites were among the lowest of the four monitoring periods, with mean TP concentrations below the TP criterion of 10 micrograms per liter ($\mu\text{g/L}$), or parts per billion (ppb), in all portions of the EPA (see table). The continued decrease in TP concentrations likely reflects the nutrient removal efficacy of Best Management Practices and Stormwater Treatment Areas and the progressive recovery of nutrient-impacted areas.

The TP criterion rule specifies that each component of the four-part test be achieved for a water body to be considered in compliance with the criterion. Data from WY2006–WY2010 indicate that the phosphorus-unimpacted portions of each WCA passed all four parts of the test and therefore were in compliance with the 10 $\mu\text{g/L}$ criterion. While phosphorus-impacted portions of the WCAs did not achieve this criterion, TP concentrations at 61 percent of the phosphorus-impacted sites were below the 15 $\mu\text{g/L}$ annual single-site limit during WY2010.

Mean Total Phosphorus Concentrations
(parts per billion)*

EVERGLADES AREAS	WATER YEAR 2010		WATER YEARS 2005–2009	
	INFLOW	INTERIOR	INFLOW	INTERIOR
REFUGE	56.0	9.9	95.0	10.7
WCA-2A	27.0	9.5	32.0	12.9
WCA-3A	24.0	5.4	35.3	8.3
PARK	10.0	4.3	9.0	5.6

* Inflow concentrations are flow-weighted means; interior concentrations are geometric means.

Mercury and Sulfur Monitoring, Research and Environmental Assessment in South Florida

As a highly toxic form of mercury that bioaccumulates in food chains, methylmercury presents risk to wildlife and humans that consume Everglades fish. Sulfur in the form of sulfate increases the rate of methylmercury production in much of the Everglades marsh and may promote phosphate releases from sediments, while sulfide is toxic to aquatic plants and animals. Regional effects of elevated mercury and sulfur concentrations are evident — and the Everglades has among the highest mercury levels in fish in Florida. Options for reducing these levels include mercury and sulfur source reduction, although this may prove challenging because it is probable that the predominant remaining mercury source to the Everglades is atmospheric deposition from international sources.

To address these concerns, the Florida Department of Environmental Protection and the District are continuing coordinated efforts to better understand the sources, transformations, and toxicity of mercury and sulfur. Volume I, Chapter 3B updates mercury and sulfur science for South Florida. In addition to largemouth bass (*Micropterus salmoides*) monitoring, this year's chapter reviews historical mercury levels and trends in wildlife including the American alligator (*Alligator mississippiensis*), the Florida panther (*Puma concolor coryi*), and the invasive Burmese python (*Python molurus bivittatus*).

Key Findings of Research and Monitoring

- In the WCAs over the past 20 years, there has been a significant decline in annual median mercury concentrations in largemouth bass, with a decrease of 62 percent from

1.6 parts per million (ppm) in 1991 to 0.6 ppm in 2009. Over the past decade, median mercury levels in bass have varied little, ranging from 0.4 to 0.6 ppm. Yet, present concentrations in bass average twice the U.S. Environmental Protection Agency's recommended human health criterion for fish consumption.

- In the Shark River Slough region of Everglades National Park, there has been no significant trend in annual median mercury levels in largemouth bass over the past two decades. This indicates continued favorable conditions for methylmercury production and bioaccumulation. In 2010, the median mercury concentration in bass was 1.4 ppm, which markedly exceeds both federal wildlife protection and human health criteria.
- About 60 percent of the Everglades marsh area has sulfate concentrations that exceed the desired restoration goal of 1 ppm in surface waters; 1 to 2 ppm of sulfate may represent a threshold level below which mercury methylation rates are relatively low. Further research is needed to quantify sulfur sources and better understand sulfur-related effects on the Everglades ecosystem.
- A regional sulfur mass balance study is under way to determine the amount of sulfur exchanged between Lake Okeechobee, the Everglades Agricultural Area (EAA), WCA-1, and WCA-2. During periods of normal or high rainfall, the EAA is a key source of sulfur to the downstream Everglades, mostly due to sulfur release by soil oxidation as well as agricultural sulfur application and runoff.



Nutrient Source Controls for the South Florida Environment



Source Control Program Areas

LEGEND

NORTHERN EVERGLADES

- LAKE OKEECHOBEE WATERSHED
- CALOOSAHATCHEE RIVER WATERSHED
- ST. LUCIE RIVER WATERSHED

SOUTHERN EVERGLADES

- EVERGLADES CONSTRUCTION PROJECT BASINS
- NON-EVERGLADES CONSTRUCTION PROJECT BASINS

Volume I, Chapter 4 provides an update on the phosphorus and nitrogen source control programs being implemented for the Northern and Southern Everglades by the District (see map). Nutrient source control programs are based on mandatory and incentive-driven Best Management Practices (BMPs). BMPs apply to agricultural and non-agricultural areas and range from infrastructure improvements to optimized operations. By reducing nutrients in runoff, source controls aid in the restoration of wetlands, rivers, lakes, and estuaries.

Program goals include water quality performance measures for all basins that are used to assess the progress made by implementing BMPs toward achieving overall restoration objectives. District programs are under way for the Lake Okeechobee watershed and Southern Everglades, while Caloosahatchee and St. Lucie River Watershed Protection Programs are now being developed. Northern Everglades efforts are being coordinated with the Florida Department of Environmental Protection and Florida Department of Agriculture and Consumer Services. Highlights of the source control programs are presented below.

Northern Everglades: Lake Okeechobee and River Watersheds

- Coordinated efforts to execute source control programs are ongoing. The District is also developing methods to measure the overall performance of these programs.
- Over the past year, Lake Okeechobee watershed's upstream water quality monitoring network was optimized to improve sampling location efficiency.
- The District reviewed the adequacy of the water quality monitoring network for assessing the performance of the source control programs in the river watersheds and is conducting further monitoring in areas with data gaps.

Southern Everglades

- Implementation of mandatory source control programs and water quality initiatives by the District continues. Several research and demonstration projects are also being conducted to increase knowledge of BMP effectiveness.
- During WY2010, the Everglades Agricultural Area and C-139 basins were in compliance with their mandated water quality performance measures.
- Rulemaking, including additional BMP requirements and refinements to the performance measures methodology, was completed for the C-139 Basin.
- WY2010 total phosphorus runoff from the non-Everglades Construction Project (non-ECP) basins was 24.5 metric tons.

Performance and Optimization of the Everglades Stormwater Treatment Areas

The six Everglades Stormwater Treatment Areas (STA-1E, STA-1W, STA-2, STA-3/4, STA-5, and STA-6) are situated south of Lake Okeechobee in the Everglades Agricultural Area vicinity (see map on p. 4). Varying in size, configuration, and period of operation, the constructed STAs are shallow, freshwater marshes providing roughly 45,000 acres of effective treatment area to reduce phosphorus levels in surface waters entering the EPA. In Volume I, Chapter 5 presents the STA performance, construction, operation and maintenance, and research and optimization efforts during WY2010. The chapter also fulfills various reporting mandates and addresses components identified in the Long-Term Plan for Achieving Water Quality Goals in the EPA (Long-Term Plan).

Everglades STA Overview

- Since 1994, the STAs combined have received more than 10 million ac-ft of inflow and retained 1,403 metric tons (mt) of total phosphorus that would have otherwise entered the EPA, reducing TP loads by 73 percent and levels from an overall annual flow-weighted mean TP concentration of 145 to 40 parts per billion (ppb).
- During WY2010, the STAs collectively treated about 1.4 million ac-ft of water — nearly 20 percent more than WY2009 — and reduced inflow TP levels from a flow-weighted mean concentration of 147 to 33 ppb in the outflow. The STAs retained 192 mt of TP and reduced the inflow TP load to the EPA by 76 percent.
- STA management continues to focus on optimizing and sustaining treatment area performance. As part of ongoing STA enhancements, conversions from emergent to submerged aquatic vegetation are under way in portions of STA-2 and STA-3/4. Tolerant to fluctuating water levels, giant bulrush (*Scirpus californicus*) was planted in STA-1E, STA-1W, and STA-5 to further optimize their performance.
- During 2010, bird nesting surveys were conducted in accordance with the Avian Protection Plan. A total of 227 black-necked stilt (*Himantopus mexicanus*) nests were observed, mostly at STA-1E. Several Everglade snail kite (*Rostrhamus sociabilis plumbeus*) nests were found in STA-5; this is the first time that nesting of this endangered species has been observed in an STA. The presence of these migratory and protected birds creates an operational challenge to avoid impacts to nests while continuing to treat water in the STAs.

Ecology of the Everglades Protection Area

The District and other collaborating agencies sponsor dozens of research projects that focus on several key study areas, including hydrology, water quality, and ecosystem structure and function, to support developing performance measures and defining operational plans for Everglades preservation and restoration. Volume I, Chapter 6 covers major research studies associated with Everglades plant, landscape, wildlife, and ecosystem ecology, with WY2010 highlights below.

- The annual monitoring of wading bird nesting showed the negative impact of an unusually cold winter coupled with high, off-season rainfall, up to 26 percent higher than the 15-year historical average. Widespread nest abandonments occurred throughout the system, especially in March and April 2010.
- Twelve priority nonindigenous species in the EPA, including five plants and seven animals, were evaluated for local distribution, related impacts on natural systems and planned restoration efforts, and effectiveness of control programs. Recommended actions for each species were also provided to support future management decisions.
- Several multi-year research projects focus on tree island plants in the Everglades. In one study, results show that hydrologic conditions on tree islands two years prior may be the most important risk factor for infestation by invasive Old World climbing fern (*Lygodium microphyllum*).
- In a second study, sap flow of woody species, including willow (*Salix caroliniana*), pond apple (*Annona glabra*), and cocoplum (*Chrysobalanus icaco*), was found to be a useful indicator for monitoring tree stress responses to

hydrological changes on the islands. In another descriptive study, it was found that seedlings and saplings of woody species survive best on tree island sites where high water level durations are short and soil nutrients are high.

- In a pilot study, vanishing tree islands in WCA-2 appear to have formed across a broader spectrum of geological conditions than previously thought, and the elevation difference between an island and surrounding marsh was greatest in southern WCA-2A despite the higher stages and deeper conditions in this area. Peat composition may be a critical factor in determining the status of a tree island.
- In other projects, digital aerial sketch mapping was used to show the distribution of priority nonindigenous plant types across the EPA. Mapping efforts also indicate that tree islands are continuing to decline in WCA-3.
- Research to address the nutrient-impacted portions of the EPA continues. Two ecosystem-scale projects target mechanisms to accelerate the recovery of cattail-dominated marsh, and another research study used plant fossil seeds to determine historic hydrologic regimes. In related findings, the outcomes of a wetland ecosystem model simulation suggest that late summer fires during low-water depth would result in the greatest reduction in phosphorus when burning off nutrient-rich materials.
- A paleoecological analysis of Everglades soil cores that examined fossil seeds suggests that between 4,000 and 3,000 years ago natural climate variability shifted the Everglades from a very wet sawgrass-water lily, ridge-and-slough landscape to a drier, fire-dominated, tree island-forming landscape.



Everglades Restoration Update

The South Florida Water Management District and the U.S. Army Corps of Engineers are partners in the largest ecosystem restoration program in the nation, the Comprehensive Everglades Restoration Plan (CERP). The District also cooperates with other governmental agencies on complementary water quality and ecosystem restoration programs, which include the Kissimmee River Restoration, Northern Everglades and Estuaries Protection Program (NEEPP), and Everglades Forever Act and Long-Term Plan projects. Comprehensively, Everglades restoration is a broad-reaching effort to identify, plan, implement, and adapt solutions designed to restore, preserve, and protect the Greater Everglades ecosystem.

In Volume I, Chapter 7 provides an annual update on the suite of projects and initiatives (intended to improve the water quality, timing, and distribution of water deliveries), many of which are under way in collaboration with state, local, federal, and tribal partners. Key activities and advancements associated with CERP, NEEPP, and Restoration Coordination and Verification (RECOVER) are presented in the chapter. Interrelated work is also covered in several other Volume I chapters, including Chapter 8 (Long-Term Plan), Chapters 4 and 10 (Lake Okeechobee Protection Program), Chapter 11 (Kissimmee Basin), and Chapter 12 (coastal estuary activities associated with Everglades restoration). To further streamline Volume I reporting, supporting project-specific details are provided in the SFER Consolidated Project Report Database (see p. 18). Additionally, Volume III contains detailed permit-related information pertaining to Everglades restoration projects (see p. 25). A snapshot of noteworthy updates and accomplishments during the reporting period follows.

Comprehensive Everglades Restoration Plan

- A total of 232,505 acres, or 60 percent, of estimated lands needed for CERP have been acquired as of September 2010. This includes the FY2010 purchase of 130 shoreline acres to help restore freshwater flows to Biscayne Bay and Biscayne National Park (see photo).
- For the Picayune Strand Restoration Project, hydrology has been partially restored in the eastern Picayune Strand and western Fakahatchee Strand since the filling of the Prairie Canal and removal of eastern roads. Some die-off of young cabbage palms (*Sabal palmetto*), a desired result of restoration, has occurred near the filled Prairie Canal where water levels have risen. In January 2010, construction of the Merritt Pump Station and Phase II road and logging tram removal began.
- Construction of the Frog Pond Detention Area, modifications to the Aerojet Road Canal, and plugging the C-110 and L-31E canals for the C-111 Spreader Canal Western Project also started in January 2010.
- Construction of the L-31E culverts and Deering Estate features for the Biscayne Bay Coastal Wetlands – Phase I Project was launched in May 2010.
- In summer 2010, project-specific agreements (known as Project Partnership Agreements) were executed between the District and the U.S. Army Corps of Engineers to move forward with the CERP Site 1 Impoundment (Fran Reich Preserve), L-31N (L-30) Seepage Management Pilot, and Melaleuca Eradication and Other Exotic Plants projects.
- In September 2010, the District's Governing Board and the U.S. Army Corps of Engineers approved a Project Partnership Agreement to move forward on the Indian



River Lagoon – South Project, enabling the construction of the C-44 Reservoir and STA, two priority water storage and quality improvement components.

- The Acme Basin B Discharge Project was completed and named by the American Society of Civil Engineers Palm Beach Branch as the “Outstanding Project of the Year for 2009.”

Northern Everglades and Estuaries Protection Program

- The Lake Okeechobee Watershed Protection Plan update is under way and expected to be submitted to the Florida legislature in 2011.
- Water quality and water storage targets were developed for the Fisheating Creek Feasibility Study, which is the first sub-watershed feasibility study conducted as part of the Lake Okeechobee Watershed Construction Project Phase II Technical Plan.
- Also under the Phase II Technical Plan, construction continues on the Lakeside Ranch STA – Phase I Project, which is expected to be completed in 2012. This constructed wetland is planned to remove nutrients from stormwater runoff in the Taylor Creek/Nubbin Slough Basin before entering Lake Okeechobee.
- Development and implementation of regulatory and incentive-based nutrient source control programs in the Northern Everglades watersheds continue to progress; related efforts include monitoring network and data evaluations, updating load reduction estimates using a new Watershed Assessment Model, and establishing performance metrics.
- More than 12,000 acres of marsh were treated for control of invasive torpedograss (*Panicum repens*) and water hyacinth (*Eichhornia crassipes*) in Lake Okeechobee.
- Pilot demonstration projects, such as the Hybrid Wetland Treatment Technology Project, are being conducted to help identify new, innovative technologies designed to improve the quality of water flowing into Lake Okeechobee and the St. Lucie and Caloosahatchee rivers and estuaries.
- As part of the St. Lucie River Watershed Protection Plan, construction began on the Manatee Pocket Dredging, Manatee Creek Water Quality Retrofit, and North River Shores Vacuum Sewer System water quality improvement projects, which are cost-shared with Martin County.

RECOVER

- The System Status Report was updated, as required every two years; this latest version includes an interactive webpage that allows users to readily locate needed information.
- CERP modeling conditions, which reflect the Master Implementation Sequencing Plan Band 1 projects and the revised Integrated Delivery Schedule, were also updated during 2010.

- The CERP Adaptive Management Integration Guide and related guidance memorandum were completed. Together, these documents translate CERP adaptive management concepts into practical steps to guide and direct implementation at both systemwide and project levels.



Implementation of the Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area

In accordance with the Everglades Forever Act, the District developed the 2003 Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area (Long-Term Plan). The plan's foremost objective is for all surface water discharges to the Everglades Protection Area to achieve and maintain water quality standards. Volume I, Chapter 8 updates the agency's progress on fulfilling Long-Term Plan requirements and its subsequent amendments.

The Long-Term Plan encompasses numerous water quality improvement strategies including STA expansions and vegetation improvements, agricultural source control initiatives and studies, improved regulatory approaches, and new water storage, conveyance, and treatment facilities. The Long-Term Plan also contains restoration projects intended to assist in accelerating the recovery of impacted areas in the EPA. These diverse activities are covered in several other Volume I chapters, including Chapter 3A (Everglades water quality), Chapter 4 (nutrient source controls for Everglades tributary basins), Chapter 5 (STA performance and enhancements), Chapter 6 (research on impacted Everglades ecosystems), Chapter 7 (updates of annual work plans and activities for CERP, NEEPP, RECOVER, and related watershed plans and programs), Chapter 12 (coastal estuary activities associated with Everglades restoration), and Chapter 13 (financial reporting on Long-Term Plan activities).

Plan Efforts Toward Improving Water Quality Continue

Advances on the Long-Term Plan continued in FY2010, along with the construction of Compartments B and C build-outs (see photo), which are expansions of the existing Everglades STAs. When completed, these projects will increase the size and are expected to enhance the performance of the treatment wetlands. In addition, substantial progress in reducing TP levels discharged into the EPA to meet the TP criterion has been made by the State of Florida and other stakeholders.

Since their inception and through the end of April 2010, agricultural Best Management Practices and Everglades Stormwater Treatment Areas have collectively removed more than 3,500 metric tons of TP that otherwise would have entered the EPA. To augment this progress, continuing nutrient source controls are being carried out strategically in urban and other tributary basins in the Everglades.

To ensure new information is timely incorporated into the Long-Term Plan, the plan is revised in an adaptive manner. To date, nine plan revisions have been approved by the Florida Department of Environmental Protection. These revisions are highlighted in Volume I, Chapter 8, of the 2005–2009 SFERs.



Status of Nonindigenous Species in the South Florida Environment

With its mild climate, diverse environments, and rising urbanization, South Florida is particularly vulnerable to invasion by nonnative species. In Volume I, Chapter 9 reviews broad issues of key “District-centric” nonindigenous plants and animals plaguing South Florida and related impacts to restoration, management, planning, organization, and funding. The chapter provides updates on 24 priority species and notes emerging threats to native plants and animals. It also reflects that in FY2010, the District spent roughly \$24 million on the prevention, control, and management of priority invasive species in the region.

The District has the nation’s largest aquatic plant management program, managing floating and submerged aquatic vegetation region-wide. The agency’s successful melaleuca (*Melaleuca quinquenervia*) management program has become a national model for regional, interagency invasive plant control programs. The Florida Fish and Wildlife Conservation Commission continues to develop its invasive animal management program and develop closely with the District and other partners to manage nonnative animals in South Florida. Looking ahead, nonnative invasions will continue to exert pressure on native species and ecosystem functions and require long-term, multi-agency management.

Nonindigenous Plants

- An aggressive invader now listed as a Federal Noxious Weed, Old World climbing fern (*Lygodium microphyllum*) is an epiphytic vine that can engulf whole tree islands if left unchecked. Herbicides and biological control agents continue to be used, while other control methods are being studied for their effectiveness.
- Melaleuca has been systematically cleared from Lake Okeechobee, Water Conservation Areas 2 and 3, and Big Cypress National Preserve. Integrated control efforts have stopped the spread of the trees in these areas, while infestations in the eastern portion of Everglades National Park and East Coast Buffer lands remain targets for control.
- Brazilian pepper (*Schinus terebinthifolius*) is the most widespread invasive species in the District. Some progress has been made in managing this species in more accessible areas, but many remote Everglades regions remain infested. Also, this prolific seed producer remains abundant on rights-of-way and adjacent private lands, facilitating constant reestablishment on conservation lands. Effective biological controls remain unavailable but are needed to achieve successful region-wide control. The District and agency partners are aggressively pursuing potential agents for release.

Nonindigenous Animals

- The lionfish (*Pterois volitans*) is a venomous marine fish native to the Indian and Pacific oceans that is now spreading throughout Caribbean and U.S. coastal waters (see photo). This predatory fish poses a significant threat to coral reef and mangrove ecosystems because it both preys on and competes for food with native, marine wildlife. Specifically, lionfish could cause a reduction of native herbivorous species needed to control seaweed growth on corals. Interagency control efforts for lionfish are being studied, while its fishing for sport is being promoted.
- Control of the Burmese python (*Python molurus bivittatus*) and northern African python (*P. sebae*) is a top priority among agencies and policy makers. The Burmese python is known to prey on at least 20 native species. Record cold weather during early 2010 resulted in widespread python mortality, but recent monitoring confirms survival of individuals among all age classes. The development of a trap to capture free-ranging pythons is a significant new milestone toward implementing region-wide management. An interagency effort to eradicate the newly documented northern African python population is also under way in Miami-Dade County.
- An emerging threat, the Argentine black and white tegu (*Tupinambis merianae*) is a large reptile that preys opportunistically on the eggs and young of ground-nesting animals such as turtles and birds. Systematic surveys are needed to measure the extent of populations, with an interagency control plan being adopted quickly to eradicate this species from sensitive areas.



Lake Okeechobee Protection Program – State of the Lake and Watershed

To improve the ecological health of Lake Okeechobee, the District and collaborating agencies are working to reduce excessive total phosphorus (TP) loading, large variation in water levels, and the rapid spread of nonindigenous plant species. Several components of the Comprehensive Everglades Restoration Plan and the Northern Everglades and Estuaries Protection Program are addressing elevated TP levels and providing alternative water storage to improve the regulation of lake levels. Volume I, Chapter 10 presents the WY2010 status of Lake Okeechobee and its watershed for these coordinated efforts.

Lake Okeechobee Operations

A very dry winter in WY2009 led to declines of water levels in Lake Okeechobee to below the water shortage management line. Increased rainfall at the end of the dry season returned water levels above this regulation schedule in May 2009. Water levels remained within the target range of 12.5 to 15.5 feet National Geodetic Vertical Datum (NGVD) for the remainder of the water year. Water flows to the lake in WY2010 were 2.4 million acre-feet, similar to the historical average. Above-normal rainfall in March and April 2010 resulted in lake water levels increasing to 14.5 feet NGVD. Regulatory pulse releases began in March 2010 and continued for two months, with only 12 days without flow.

Aquatic Vegetation at Restoration Goal

Submerged aquatic vegetation (SAV) type and abundance in Lake Okeechobee are key indicators for the health of this

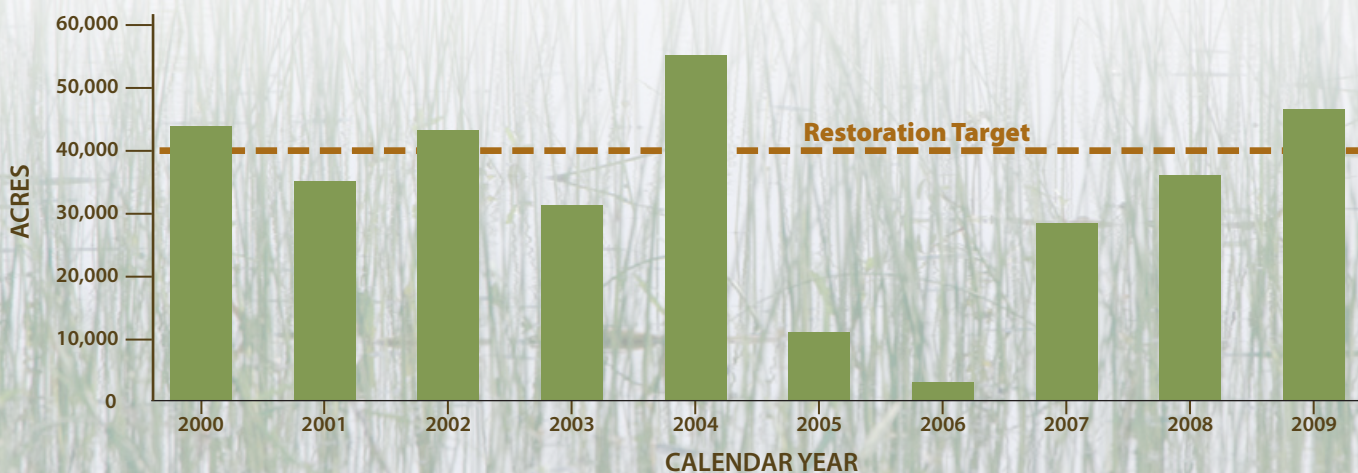
freshwater ecosystem. SAV coverage reached 46,418 acres this year, a milestone not achieved since WY2004, meeting the lake's goal of more than 40,000 acres (see graph). Also, the SAV composition of almost 65 percent vascular plants exceeded the community goal of at least 50 percent. These plants are desirable as they provide sheltering nurseries for young fish, offer superior forage for adult fish, and enhance water clarity.

Water Quality Performance Measures

Despite a long history of regulatory and voluntary programs to control TP loads into Lake Okeechobee, no substantial reduction has occurred in the past 20 years. Over time, excess TP has promoted harmful algae blooms, increased the spread of exotic plants, and reduced water clarity. To address the elevated nutrient levels, the Lake Okeechobee Watershed Protection Plan develops management strategies to achieve the TP Total Maximum Daily Load (TMDL) for the lake.

The Lake Okeechobee Watershed Protection Program, an integrated approach to protect the lake, requires that the Lake Okeechobee Watershed Protection Plan be updated every three years. Agency efforts to update the plan began in early 2010. Routine water quality monitoring, particularly for phosphorus, is a key aspect of fulfilling the program's many requirements. From WY2006–WY2010, the average TP load to the lake was 496 metric tons per year, which is about 3.5 times higher than its established TMDL. Perhaps a sign of recovery from the active tropical seasons of 2004 and 2005, in-lake TP concentrations declined to 120 parts per billion in WY2010, similar to pre-hurricane levels.

Submerged Aquatic Vegetation in Lake Okeechobee (2000–2009)



Note: 2000 based on 0.5 km² grid; 2001–2009 based on 1 km² grid.

Kissimmee Basin

Characterized by diverse wetland and lake ecosystems, the Kissimmee Basin forms the headwaters of the historic Kissimmee-Okeechobee-Everglades system. The Upper Basin includes more than two dozen water bodies and their tributary streams, known as the Kissimmee Chain of Lakes, and the Lower Basin comprises the Kissimmee River and floodplain. Channelized for flood control in the 1960s, the Kissimmee River and floodplain experienced ecological consequences when flow in the original river channel ceased, which also prevented seasonal inundation of the floodplain. This led to drastic declines in wetlands, diminished fish and wildlife populations, and loss of ecosystem functions.

In partnership with the U.S. Army Corps of Engineers, construction on the Kissimmee River Restoration Project began in 1999. Three of four restoration phases have been completed to date, with the final phase scheduled to be completed in 2014. Numerous ecological benefits of the project have been documented by the Kissimmee River Restoration Evaluation Program. In recent years, the District has worked to integrate the restoration project with various management strategies for the Kissimmee Basin and Northern Everglades region, including the Kissimmee Chain of Lakes Long-Term Management Plan, Water Reservations for the Kissimmee Basin, and the Lake Okeechobee Watershed Protection Program. Volume I, Chapter 11 highlights the major activities during WY2010 associated with the Kissimmee Basin.

Kissimmee Basin Accomplishments


- Phase IVB backfilling of the C-38 canal was completed, reestablishing flow to 6 miles of reconnected river channel. A new boat ramp was built on the Istokpoga Canal, and construction progressed on a new water control structure in the Istokpoga Canal and the widening of the C-37 canal in the Upper Kissimmee Basin.
- Total phosphorus loads and concentrations measured in the C-38 canal below the Phase I area have continued to decline since WY2005, but are still above baseline levels. Coverage of desirable wetland vegetation has increased in the Phase I area, although the broadleaf marsh community is still underrepresented. In WY2010, numbers of wading birds and waterfowl were greater than in WY2009, and their three-year running averages exceeded restoration expectations.
- Baseline data collection continued in the Phase II/III area of the Kissimmee River where restoration construction will begin in 2012. These data will provide an important benchmark for evaluating this stage of restoration.
- Additional technical work was initiated to identify water required for the protection of fish and wildlife in East Lake



Tohopekalgia, in support of Water Reservation development for the Kissimmee River and Kissimmee Chain of Lakes.

- Operations under the interim regulation schedule for the S-65 structure — which controls releases from the Kissimmee River's headwaters lakes — maintained continuous inflow to the river in WY2010. Discharge from S-65 was sufficient to inundate portions of the floodplain for most of the wet season.

Coastal Ecosystems



The District and collaborating agencies are working to preserve and improve South Florida's coastal estuaries, which depend on fresh water for their existence and health. In Volume I, Chapter 12 presents key information and environmental results for the coastal regions where efforts are focused on supporting restoration projects and regulatory rules, such as Minimum Flows and Levels. The chapter also serves as the annual report for the Caloosahatchee River and St. Lucie River Watershed Protection Plans under NEEPP. WY2010 highlights of coastal ecosystem findings and protection plan implementation are presented below.

Freshwater Inflows. In general, dry season discharges to coastal systems were higher than normal due to the prevailing El Niño. El Niño-related rains likely reduced the severity of high salinity events in Biscayne Bay where salinity targets were not exceeded. Minimum Flows and Levels that have been established for the St. Lucie River and Estuary, Loxahatchee River, and Florida Bay were mostly met in WY2010. Minimum flow salinity criteria were exceeded in the Caloosahatchee Estuary in late 2009, but target freshwater flows were achieved during the first six months of 2010.

Water Quality. In WY2010, no harmful algal blooms or periods of prolonged low oxygen levels occurred in coastal ecosystems. With a few exceptions, water quality was similar to long-term patterns. The abnormally low winter water temperatures associated with El Niño did result in die-offs of fish, crocodiles, and manatees in Florida Bay.

Indicators of Ecosystem Health. Depending on the specific area, oysters, seagrasses, floodplain vegetation, and fish assemblages are used to assess ecological conditions in coastal estuaries and bays. WY2010 monitoring of these indicators showed some improvement or no change in relative conditions compared to the previous year. Eastern oyster (*Crassostrea virginica*) populations increased in the St. Lucie, Loxahatchee, and Faka Union estuaries as well as Lake Worth Lagoon. Seagrass coverage increased in the Southern Indian River Lagoon, while recovery from previous lows continued in the Loxahatchee Estuary and Lake Worth Lagoon. In Florida Bay, the overall status of seagrasses improved slightly since last year. Also, fish groupings in Biscayne Bay remained stable.

St. Lucie and Caloosahatchee River Watershed Protection Plans. Both plans include local water quality improvement projects, and several of these are moving forward in both systems. For the St. Lucie, these include the Old Palm City Phase 3, Manatee Creek Retrofit, and Manatee Pocket Dredging projects. In the Caloosahatchee, the C-43 Water Quality Treatment and Testing Facility, Spanish Creek/Four Corners Environmental Restoration, and the Powell Creek Algal Turf Scrubber® projects are all under way.

Everglades Forever Act Annual Financial Report

Pursuant to the 1997 Everglades Oversight Act, the South Florida Water Management District annually provides detailed financial information on Everglades restoration. The Everglades Forever Act (EFA) also requires the District to account for all monies used to fund the Everglades Construction Project (ECP) and the Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area (Long-Term Plan). This reporting includes an annual comparison of actual versus projected revenues and a projection of costs and revenues over the next five-year period. These annual financial reports are central to Volume I, Chapter 13.

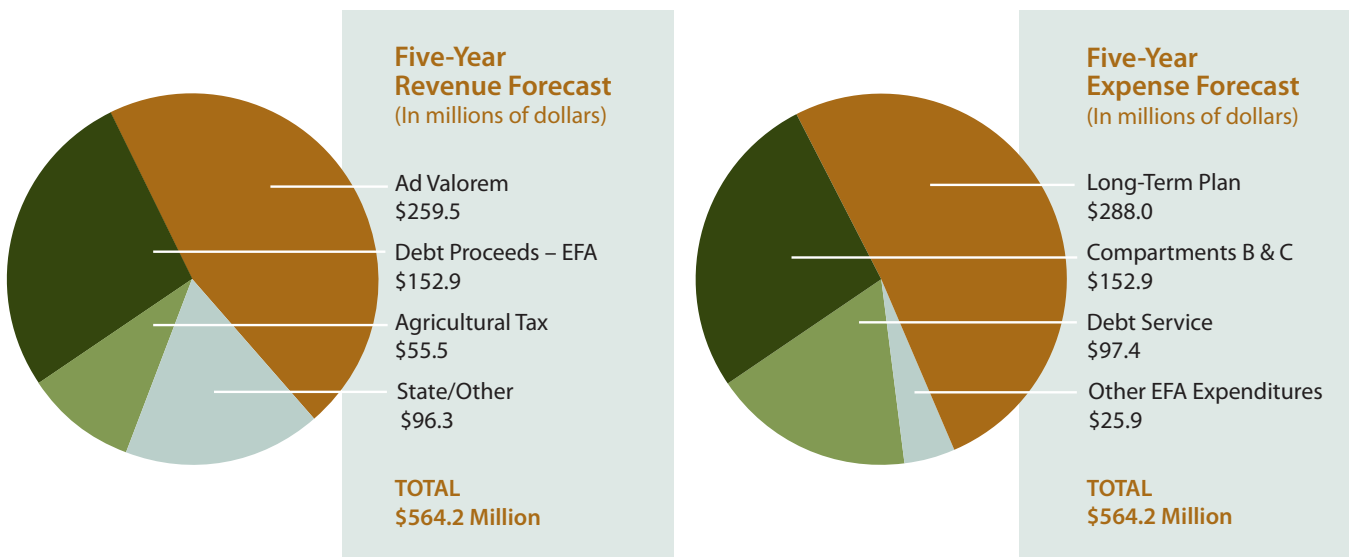
Dedicated Funds for Everglades Restoration

A major element of the Everglades Forever Act, the ECP is one of the nation's largest environmental restoration projects. The 1994 ECP capital projects were completed in FY2007 for a total cost of \$514.8 million. When combined with the federal share of \$198.9 million, the total capital cost associated with the 1994 ECP is \$713.7 million. The 2003 Long-Term Plan continues and expands the goals and objectives of the 1994 ECP and is a critical component of the overall effort to restore and protect the Everglades. In the EFA, the 1/10 mill *ad valorem* tax

includes the initial phase of the Long-Term Plan. For FY2011, the EFA has a reduced millage rate of 0.0894 mill, resulting from mandated state property tax changes in 2007. The Long-Term Plan's initial, 13-year phase has a projected total cost of approximately \$1.2 billion, reflecting approved plan revisions through the end of FY2010. When combined with the ECP, the total estimated cost of implementing the EFA program is roughly \$2 billion.

As shown in the pie charts, the five-year forecast (FY2011–FY2015) of revenues by source and expenditures for the EFA program totals just over \$564 million. The expenditure forecast comprises \$538.3 million for the overall Long-Term Plan, of which \$152.9 million is for the construction of the Stormwater Treatment Area Compartments B and C build-outs and will be supplemented with the proceeds from Certificates of Participation issued in FY2007. A total of \$288 million is for Long-Term Plan related activities such as source controls and the optimization, operations, and maintenance of the Stormwater Treatment Areas, and \$97.4 million is for the payment of debt service associated with previously issued Certificates of Participation. The remaining \$25.9 million is for other EFA-related projects such as monitoring, assessment, research, and evaluation.

Five-Year Everglades Forever Act Program (Fiscal Years 2011–2015)





VOLUME II

District Annual Plans and Reports

Chapter 2005-36, Laws of Florida, and Subsection 373.036(7), Florida Statutes, directs each of the state's water management districts to consolidate its annual plans and reports that are submitted to Florida's governor and legislature. Since 2005, the South Florida Water Management District has fulfilled this mandate by presenting the applicable plans and reports in Volume II of the SFER. Incorporation of these reports into a single document has improved reporting efficiency and quality while also making the information more accessible to policy makers, stakeholders, and the public.

The project-related information described in this volume parallels the District's performance management cycle throughout the fiscal year (October 1 through September 30). During this period, the Strategic Plan, Annual Work Plan, and Annual Budget are developed and implemented, followed by evaluation and reporting. Consistent with chapter topics and content in corresponding reports of the other water management districts, Volume II chapters cover the following:

- Annual Work Plan Report
- Priority Water Bodies List and Schedule
- Five-Year Capital Improvements Plan
- Five-Year Water Resource Development Work Program
- Alternative Water Supply Annual Report
- Florida Forever Work Plan, Annual Update
- Land Stewardship Annual Report
- Mitigation Donation Annual Report

Now in its seventh year, the SFER Consolidated Project Report Database provides a comprehensive update on many District projects (activities with start and end dates) and processes (ongoing activities) that are referenced in the 2011 SFER. The database is designed to uniformly describe projects and processes linked to report-related planning efforts and provide these details in one accessible location rather than repeating them in several reports. It also enables rapid data sorting, searches, and retrieval for efficient information and project management. The 2011 database is available at www.sfwmd.gov/sfer.

Fiscal Year 2010 Annual Work Plan Report

The South Florida Water Management District's annual business cycle is composed of four key elements: the Strategic Plan, Annual Work Plan, Annual Budget, and Reporting and Evaluation. Under this process, Work Plan Reports are prepared quarterly, with the fourth quarter report representing the status at the end of the fiscal year. In Volume II, Chapter 2 presents the year-end report of the FY2010 Annual Work Plan, the final step of the annual reporting cycle. The chapter highlights the FY2010 status of project schedules, financial summaries, and success indicators.

As in previous fiscal years, adherence to the planned schedules during FY2010 for all District projects and processes was categorized using color-coded criteria (see pie chart). Using these criteria, 83 percent of these activities were green, 6 percent were yellow, and 11 percent were red. Comparable to the last two fiscal years, 89 percent of all projects collectively were within 60 days of their planned schedules.

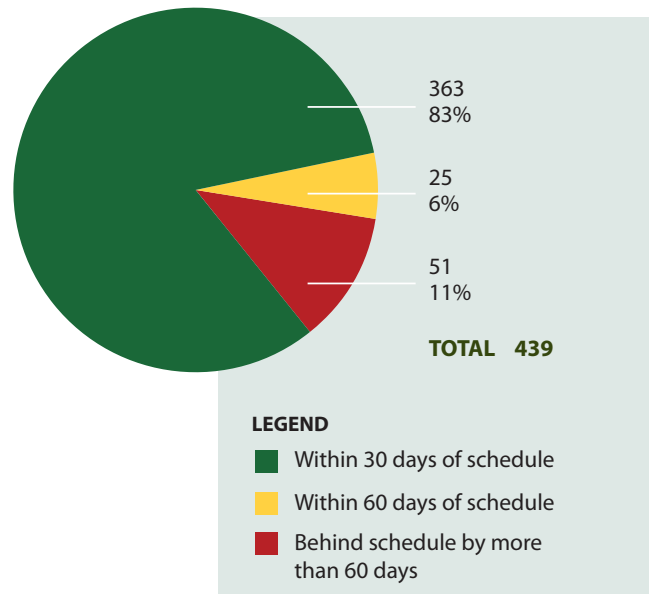
Revenues Decline Again in Fiscal Year 2010

The Annual Work Plan Report includes the status of revenue collection and expenditure rates. During FY2010, the District collected 93 percent of budgeted revenue, or \$620 million. While the percentage collected for FY2010 was similar to FY2009, the amount was \$68.1 million less than the previous year. FY2010 revenue collection rates were 98 percent of budgeted taxes (both *ad valorem* and agricultural privilege taxes), 67 percent of budgeted intergovernmental revenues, 183 percent of budgeted investment earnings, and 112 percent of other budgeted items such as leases, licenses, permits, fees, sales of District property, and self-insurance charges.

Expenditure rates are tracked as an indicator of overall program activity. In FY2010, the District spent 76 percent of the total budget of \$516 million (excluding personnel and reserves), which is the same percentage but \$24 million less than the total amount spent in FY2009. The FY2010 discretionary expenditure rate of 80 percent decreased by two percentage points from FY2009, or \$68 million, and the restricted expenditure rate of 72 percent increased from FY2009 levels by six percentage points, or \$44 million. Of the \$123 million (\$52 and \$71 million of budgeted *ad valorem* and restricted funds, respectively) that were unspent in FY2010, about 85 percent, or \$105 million, has been carried over for ongoing work in FY2011.

Fiscal Year 2010 Status of Major District Projects and Processes

(October 1, 2009–September 30, 2010)



Success Indicators Track Agency Progress

Linked to the District's Annual Work Plan and Strategic Plan, success indicators have been established for tracking agency results. These indicators identify and measure levels of success, and annual targets are used to assess year-to-year progress of the agency's projects and processes. Success indicator values are summarized in the chapter for FY2009 and FY2010. Actual indicator values for FY2010 are compared to the specific targets established at the beginning of the fiscal year, and planned indicator value targets for FY2011 are defined. Further details on success indicators, including definitions, targets, and other related information, are available on the District's website at www.sfwmd.gov/budget.

Priority Water Bodies List and Schedule

To protect and conserve adequate water supplies for natural systems, the South Florida Water Management District applies region-wide water resource protection rules as well as Minimum Flows and Levels (MFLs), Water Reservations, and Restricted Allocation Area rules. In Volume II, Chapter 3 highlights the general process and legal requirements for applying these rules to specific water bodies. The chapter also summarizes the rules in effect as of 2010 as well as the priorities and anticipated schedule for developing new proposed rules in 2011 through 2015.

Rulemaking Helps Set Aside Needed Water

In accordance with state law, each year the District identifies specific water bodies for which MFL rules will be established. Another list specifies those water bodies for which Water Reservation and Restricted Allocation Area rules will be developed in order to protect natural systems from future consumptive use allocations. To date, MFL criteria have been adopted for 12 water bodies within the District's boundaries. The agency has also authorized Restricted Allocation Area and Water Reservation rules for several water bodies, some of which also have MFLs established. The specific locations and dates when rules were established for the priority water bodies are shown on the map.

In 2010, the District adopted its second Water Reservation rule to set aside water for the North Fork of the St. Lucie River in support of the CERP Indian River Lagoon – South Project. Water Reservation rule development for the Caloosahatchee Estuary [in support of the CERP Caloosahatchee River (C-43) West Basin Storage Reservoir Project] and the Kissimmee River and Kissimmee Chain of Lakes continued throughout 2010. The District's Governing Board initiated development of the Restricted Allocation Area rule for Biscayne Bay, in support of the CERP Biscayne Bay Coastal Wetlands Project. The agency also successfully demonstrated that the 2007 Restricted Allocation Area rule protects the natural system water in the Everglades provided by the CERP Site 1 Impoundment (Fran Reich Preserve) Project, which enabled a Project Partnership Agreement to be executed with the U.S. Army Corps of Engineers and construction to start.

The 2011 MFL Priority List and Schedule is anticipated to be adopted by the District's Governing Board in early 2011 and then submitted to the Florida Department of Environmental Protection for review and approval. Planned activities related to Water Reservation and Restricted Allocation Area rules are also expected to be provided. Further details on these plans are available at www.sfwmd.gov/reservations.



LEGEND

RESTRICTED ALLOCATION AREAS

- 2007 – EVERGLADES AND LOXAHATCHEE
- 2008 – LAKE OKEECHOBEE SERVICE AREA

MINIMUM FLOWS AND LEVELS

- 2001
- 2002
- 2006

WATER RESERVATIONS

- 2009
- 2010

Five-Year Capital Improvements Plan

In accordance with state law, each year the South Florida Water Management District annually reports on the agency's Five-Year Capital Improvements Plan (CIP). The CIP includes estimated capital project expenditures and anticipated revenues over the five-year period. The plan reflects the District's priorities as outlined in its Strategic Plan, provides a formal mechanism for decision making, and serves as a financial management tool and reporting document. It reflects management plans to support the agency's mission by efficiently directing resources to District projects and processes based on strategic priorities.

In Volume II, Chapter 4 updates information presented in last year's CIP. Specifically, this chapter covers the five-year (FY2011–FY2015) financial schedule of revenues and expenditures for those capital projects approved for FY2011, along with the four-year (FY2012–FY2015) forecast. Capital improvement projects include improvement/refurbishment, construction, and land acquisition for the District's programs (see figure). More detailed descriptions of these capital projects are provided in the SFER Consolidated Project Report Database at www.sfwmd.gov/sfer.

Agency's Strategic Priorities Guide Funds

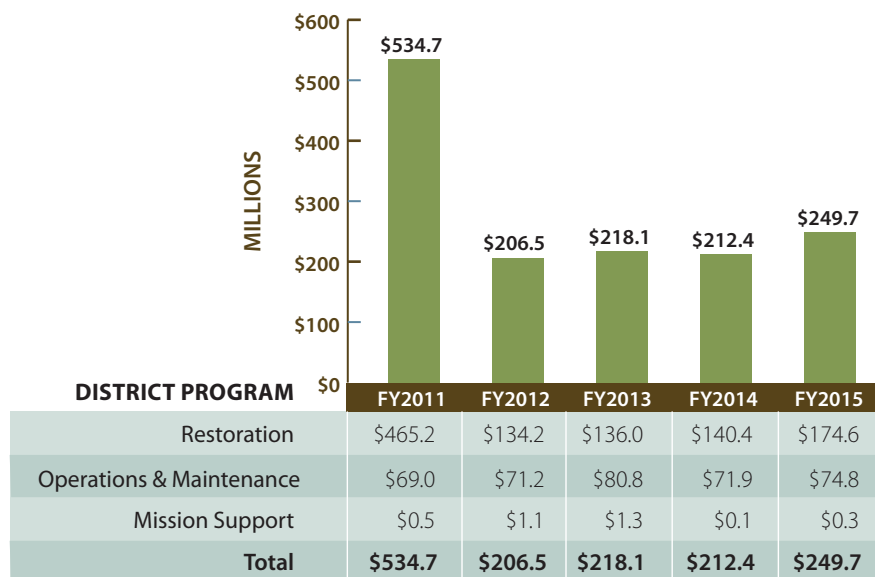
As shown in the figure, three of the District's four budgetary programs — Restoration, Operations & Maintenance, and Mission Support — include planned capital projects or land

purchases reflected in the CIP. The annual capital budget for these programs is consistent with applicable strategic priorities established by the District's Governing Board. These agency priorities are to (1) restore the Northern and Southern Everglades; (2) refurbish, replace, improve, and manage the regional water management system; and (3) meet the current and future demands of water users and the environment. With these directions in mind, Everglades restoration is planned to receive the majority of projected funds.

Five-Year Plan Forecasts Marked Reduction in Spending

The five-year CIP represents approximately \$1.4 billion of planned project costs, which is about one-third less than last year's projections. As reflected in the figure, the total FY2011 budgeted capital expenditures are \$534.7 million, representing 50 percent of the total District FY2011 budget of \$1.07 billion and 38 percent of the total five-year CIP projected budget. The FY2011 capital budget of \$534.7 million represents roughly a 50 percent decrease (\$515.5 million) from the FY2010 capital budget of \$1.05 billion, mainly attributed to the reduction in the acreage for the *River of Grass* land acquisition under the Restoration Program. Modest increases are planned for the Operations & Maintenance Program (\$67.1 million in FY2010 to \$69 million in FY2011) and the Mission Support Program (\$318,000 to \$493,000).

Five-Year Annual Capital Budget Estimates (Fiscal Years 2011–2015)



Five-Year Water Resource Development Work Program

Updated Water Supply Plans in Progress

The purpose of water supply planning is to develop strategies to meet the existing and future water demands of urban and agricultural users while still meeting the needs of the environment. Regional water supply plans are updated every five years for each of the agency's four planning regions and encompass a 20-year planning horizon. State law requires that all the water management districts prepare an annual Five-Year Water Resource Development Work Program to update the agency's implementation strategy for the water resource development component of each approved regional water supply plan. The Work Program is included in Volume II, Chapter 5A, to fulfill various reporting requirements on planning, projects, and funding related to water supply.

Since the last regional plan revisions in 2006 and 2007, the District has been updating the regional water supply plans for all four regions, with anticipated completion dates for the Upper East Coast and Lower West Coast planning areas

in FY2011 and for the Kissimmee Basin and Lower East Coast planning areas in FY2012. Plan updates identify Water Resource Development and Water Supply Development projects that are expected to meet the needs of all reasonable-beneficial uses through 2030 during a 1-in-10 year drought event, while sustaining the region's water resources and related natural systems.

Allocations for Water Resource Development Projects

The District has allotted \$3.6 million in FY2011 for Water Resource Development projects and anticipates investing \$8.1 million on these projects over the next five years (FY2011–FY2015). These allocations include \$515,000 in FY2011 and \$2.6 million from FY2011–FY2015 to implement the Comprehensive Water Conservation Program. Projected expenses do not include Comprehensive Everglades Restoration Plan projects, Aquifer Storage and Recovery projects, and projects not identified in the previous plan amendment and updates.

Alternative Water Supply Annual Report

Due to the limitations that exist on development of traditional freshwater sources, most future regional water demands will be met primarily through developing Alternative Water Supply (AWS) sources. Such alternatives include reclaimed water, storm water, salt and brackish water, surface water captured predominately during wet-weather flows, and creating additional storage capacity. To proactively address future needs, the District has been implementing a well-recognized program to provide dedicated funds to support the development of regional AWS projects for over a decade. This program, in cooperation with the state, has approved \$178.8 million since 1997 for the construction of 437 AWS projects. Volume II, Chapter 5B provides an annual update on the agency's AWS funding efforts during FY2011.

District Restores Program Funding in 2011

In 2005, the Florida legislature created the Water Protection and Sustainability Program, which established annually

recurring state funding, when available, to the South Florida Water Management District for the construction of AWS projects. This included \$30 million in FY2006 (the first year of the program), \$18 million in FY2007, \$15.6 million in FY2008, and \$4.25 million in FY2009. During this four-year period, the District approved more than \$141 million, which included Water Protection and Sustainability Program funds for 255 projects that created 400 million gallons per day of additional alternative water capacity — about four times more than the prior three years combined.

Due to revenue constraints, the AWS Program did not receive funding in FY2010. For FY2011, the State of Florida has not allocated funding for AWS projects. However, as part of agency-wide priorities, the District has allocated \$6.05 million in FY2011 for 24 projects across the region, including two in the Kissimmee Basin, eleven in the Lower East Coast, eight in the Lower West Coast, and three in the Upper East Coast planning regions.

Florida Forever Work Plan, 2011 Annual Update

In Volume II, Chapter 6A presents the 2011 annual update of the Florida Forever Work Plan. This chapter identifies projects eligible for funding under the Florida Forever Act (Section 259.105, Florida Statutes) as well as projects eligible for land acquisition monies from state-appropriated accounts or trust funds under Section 373.139(3)(c), Florida Statutes, along with five-year projected revenues and expenditures for FY2011–FY2015. Land acquisition activity during FY2010 is also provided in this chapter.

Construction Progresses under Florida Forever

The 2011 Florida Forever Work Plan update identifies a total of 56 eligible projects, which include the Comprehensive Everglades Restoration Plan, Florida Forever/Save Our Rivers, Northern Everglades and Estuaries Protection Program, and other related projects. In this reporting period, the Source Control and Sub-Regional Water Quality Project has been added to the eligible list of projects. The 2010 adopted amendments adding the Fakahatchee Strand portion of the CERP Picayune Strand Restoration Project and land adjacent to the C-44 Reservoir and STA component of the CERP Indian River Lagoon – South Project were incorporated. The Kissimmee Chain of Lakes Long-Term Management Plan is substantially complete and has been removed from the list. Additionally, the CERP expedited projects have been merged with the larger CERP projects.

For FY2011–FY2015, the estimated expenditures for eligible projects total \$614 million, of which \$539 million will be used to construct projects. The remaining \$75 million has

been designated for land acquisition, of which \$27 million will be reserved for future acquisitions. Five-year funding projections are conservatively estimated to include the Florida Forever/Save Our Everglades Trust Fund (FF/SOETF) monies totaling \$41 million and \$282 million, respectively. These projections exclude the *River of Grass* land acquisition, as it is not anticipated that FF/SOETF funds will be used for this purpose. To benefit Everglades restoration, the *River of Grass* land purchase of nearly 26,800 acres, at an investment of \$194.5 million, closed in October 2010.

Notably, the state and District land acquisition programs over the last decade have paved the way for groundbreakings and construction starts of several CERP projects in FY2010, including the Picayune Strand Restoration, C-111 Spreader Canal – Phase 1, and Biscayne Bay Coastal Wetlands/Deering Estate Flow-Way projects. Construction of the Kissimmee River boat ramp — the first recreational project funded through the Florida Forever Program — is nearly complete and expected to be available for public use in 2011.

More Land Purchased in 2010 for Greater Everglades

During FY2010, the District obtained more than 2,492 acres of land. This included 1,300 acres acquired through donations and 1,192 acres purchased for \$32.3 million, of which \$24.5 million was contributed from the SOETF. As of the end of FY2010, the District has acquired a total of 232,505 acres, or 60 percent, of the lands needed for CERP implementation.

Land Stewardship Annual Report

Land Stewardship Affords Many Benefits

Through land stewardship, the South Florida Water Management District is responsible for planning and managing agency-owned lands, including Save Our Rivers and other natural conservation lands, as well as those areas being maintained for future water resource projects. The program also administers mitigation banks and regional off-site mitigation areas and oversees the development of recreational uses on these public lands. As of FY2010, program funds come primarily from *ad valorem* tax revenues, supplemented by other funding sources including off-site mitigation, mitigation bank revenues, lease revenues, grants for wetland restoration and exotic control projects, and the Everglades Restoration Trust Fund.

In Volume II, Chapter 6B highlights the 22 Save Our Rivers and Florida Forever natural lands projects for the District's five land management regions (Upper Lakes, Kissimmee/Okeechobee, East Coast, Everglades, and West Coast) and FY2010–FY2011 land management activities and acquisition

status for each region. The chapter also provides project descriptions for major program components: hydrologic and habitat restoration, vegetation management, invasive species control, prescribed burning, wildlife management, public use, water resource education, law enforcement, mitigation, infrastructure management, and management of project lands for future Comprehensive Everglades Restoration Plan and other water resource projects.

State Partners Manage 1.4 Million Acres of Public Lands

As of September 2010, the District and its partnering agencies manage nearly 1.4 million acres of Save Our Rivers and other environmental lands, including key designated areas for planned Everglades restoration projects. During FY2010, the agency spent \$14.1 million for land management, while \$7.7 million in revenue was generated from agricultural leases, sale of products, mitigation banks, and other sources. Looking ahead, land management costs for FY2011 are projected to total \$11.3 million.

VOLUME II • CHAPTER 7

Mitigation Donation Annual Report

Wetland Mitigation Funds Benefit Regional Restoration

Mitigation is the acquisition, creation, restoration, or enhancement of wetlands to compensate for permitted wetland impacts. Each year, Florida's water management districts report on the expenditure of funds received as mitigation for such impacts. Mitigation funding enables the South Florida Water Management District to direct funds toward priority restoration in a cost-effective manner that benefits the South Florida ecosystem.

In Volume II, Chapter 7 presents mitigation fund expenditures for FY2010 and those anticipated for FY2011 for the agency's two regional mitigation projects: Corkscrew Regional Ecosystem Watershed (CREW) in Lee and Collier counties and Pennsuco in Miami-Dade County. The chapter also features restoration, monitoring, and management efforts for these projects. Spanning more than 60,000 acres in Lee and Collier counties, CREW contains some of the largest remaining

pristine cypress wetlands in the United States, providing habitat to many protected species. Covering about 13,000 acres in Miami-Dade County, Pennsuco is an impaired wetland ecosystem that likely will continue to degrade and further impact adjacent natural areas unless invasive exotics are reduced. Importantly, continued enhancements to these vital wetlands offer regional ecological benefits and contribute to overall Everglades restoration goals.

Although neither project still accepts cash payments, existing dedicated funds are used to restore and manage CREW and Pennsuco. In FY2010, the District spent \$1.2 million on environmental restoration at the two sites, including exotic treatments on 4,208 acres in CREW and 3,525 acres in Pennsuco. For these projects, the anticipated total expenditures for FY2011 are \$770,840, excluding staff support costs. Of this amount, \$336,840 is budgeted for restoration, security, and monitoring in CREW, and \$434,000 is reserved for exotic treatment, security, and monitoring in Pennsuco.

The background of the page is a photograph of a sunset or sunrise over a field of tall grasses. The sky is a warm, hazy orange, and the sun is visible as a bright, glowing orb in the upper center. The grasses in the foreground are silhouetted against the bright light, creating a layered, textured effect. The overall mood is serene and natural.

VOLUME III

Annual Permit Reports

New to the 2011 SFER, Volume III further expands the District's consolidated reporting and maximizes the submittal process for annual permit reports to the Florida Department of Environmental Protection and federal agencies, such as the U.S. Army Corps of Engineers. In addition, this volume is intended to assist in efforts to streamline the permit reporting process, so that meaningful comparisons of annual progress can more easily be made and assure the permitting agencies that the District is documenting all required permit conditions.

This volume summarizes the status and environmental results during 2010 in five chapters consisting of permit reporting for the Comprehensive Everglades Restoration Plan Regulation Act, Everglades Forever Act, Northern Everglades and Estuaries Protection Program, and Environmental Resource Permitting projects, as well as Emergency Orders in place during the reporting year.

Consistent with this updated edition of the SFER, some content from Volume I was moved into Volume III, such as the annual permit report for Lake Okeechobee operations, which is now Volume III, Appendix 4-1, and the Emergency Order current conditions reporting for the Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*), found in Volume III, Appendix 5-2.

However, because the 2011 SFER is transitional for the new volume, some permit-related reporting remains in Volume I. For example, Everglades Forever Act permit reporting requirements for the Everglades STAs are still in Volume I under the umbrella of Chapter 5. In future years, the content of Volume I reports related to state and federal permits may be folded into Volume III to more efficiently carry out the review process for annual permit-mandated deliverables.

Glossary

Acre-feet (ac-ft): The volume required to cover 1 acre to a depth of 1 foot, commonly used to express large amounts of water (1 acre-foot = 325,900 gallons).

Ad valorem tax: A tax imposed on the value of real and personal property, as certified by the property appraiser in each county.

Alternative Water Supply (AWS): A supply of water that has been reclaimed after municipal, commercial, or agricultural uses; or a supply of storm water, or brackish or salt water, that has been treated in accordance with applicable rules and standards sufficient to supply an intended use.

Aquifer Storage and Recovery (ASR): The injection of fresh water into a confined saline aquifer when water supply exceeds demand, and recovering the water when there is a supply deficit.

Best Management Practices (BMPs): Land, agricultural, industrial, and waste management techniques that reduce pollutant export from a specified area.

Certificates of Participation (COPs): As defined by Florida law (Section 373.584, Florida Statutes), a type of revenue bond that water management districts may issue to finance undertaking of any capital or other project for purposes permitted by the state's constitution.

Compliance monitoring: In a water quality management program, compliance is associated with meeting permit conditions as well as ambient standards. Periodic monitoring provides water quality data that are used to assess compliance.

Comprehensive Everglades Restoration Plan (CERP): The framework and guide for the restoration, protection, and preservation of the South Florida ecosystem. CERP also provides for water-related needs of the region, such as water supply and flood protection.

Discharge (or Flow): The rate of water movement past a reference point, measured as volume per unit time (usually expressed as cubic feet or cubic meters per second).

Drought: An extended period of low rainfall, below-normal streamflow, and depleted surface and subsurface storage.

Estuary: The part of the wide lower course of a river where its current is met by ocean tides or an arm of the sea at the lower end of a river where fresh and salt water meet.

Everglades Agricultural Area (EAA): An area extending south from Lake Okeechobee to the northern levee of Water Conservation Area 3A, from its eastern boundary at the L-8 canal to the western boundary along the L-1, L-2, and L-3 levees. The EAA incorporates almost 3,000 square kilometers (1,158 square miles) of highly productive agricultural land.

Everglades Construction Project (ECP): The foundation of a large ecosystem restoration program, composed of 12 interrelated construction projects between Lake Okeechobee and the Everglades, currently including nearly 45,000 acres of Stormwater Treatment Areas with roughly 12,000 additional acres under construction. It also contains four hydropattern restoration projects that will improve the volume, timing, and distribution of water entering the Everglades.

Everglades Forever Act (EFA): A 1994 Florida law (Section 373.4592, Florida Statutes), amended in 2003, to promote Everglades restoration and protection. This will be achieved through comprehensive and innovative solutions to issues of water quality, water quantity, hydroperiod, and invasion of nonindigenous species to the Everglades ecosystem.



Everglades Protection Area (EPA): As defined in the Everglades Forever Act, the EPA comprises Water Conservation Areas 1, 2A, 2B, 3A, and 3B, the Arthur R. Marshall Loxahatchee National Wildlife Refuge, and Everglades National Park.

Expenditure: The disbursement of appropriated funds to purchase goods or services.

Fiscal Year (FY): The 12-month period for which the annual budget is developed and implemented. The fiscal year for the District begins on October 1 and ends on September 30.

Florida Forever Act: A 1999 Florida law (Section 259.105, Florida Statutes) authorizing the issuance of bonds to fund land acquisition, water resource development, stormwater management projects, water body restoration activities, recreational facilities, public access improvements, and invasive plant removal.

Florida Statutes (F.S.): A permanent collection of state laws organized by subject area into a code made up of titles, chapters, parts, and sections. The Florida Statutes are updated annually by laws that create, amend, or repeal statutory material.

Flow-weighted mean concentration: The average concentration of a substance in water, corrected for the volume of water flow at the time of sampling. Samples taken when flow is high are given greater weight in the average.

Geometric mean: A statistical average of a set of transformed numbers, often used to represent a central tendency in highly variable data, such as water quality. It is calculated from data transformed using powers or logarithms and then transformed back to original scale after averaging.

Loading (or mass loading): The amount of material carried by water into a specified area, expressed as mass per unit of time. One example is phosphorus loading into WCA-2A, measured in metric tons per year. Note that 1 metric ton (mt) is equivalent to 1,000 kilograms, or 2,205 pounds.

Minimum Flows and Levels (MFLs): Florida law (Chapter 373, Florida Statutes) requires the state's water management districts to set water levels for each major body of water "...at which further withdrawals would be significantly harmful to the water resources or ecology of the area."

Northern Everglades and Estuaries Protection Program (NEEPP): As defined by Florida law (Section 373.4595, Florida Statutes), an initiative to holistically restore the Everglades through increased focus and integration of regional projects in the Northern Everglades, including the Lake Okeechobee watershed, and the Caloosahatchee and St. Lucie River watersheds and estuaries.

Parts per billion (ppb): A unit of measure, equivalent to micrograms per liter (1 ppb = 1 µg/L).

Revenue: Monies received from all sources, with the exception of fund balances, that will be used to fund expenditures in a fiscal year.

Stage: The height of a water surface above an established reference point. This vertical control measurement is usually expressed as feet National Geodetic Vertical Datum of 1929 or feet North American Vertical Datum of 1988.

Stormwater Treatment Area (STA): A large, constructed wetland designed to remove pollutants, particularly nutrients, from stormwater runoff using natural processes.

Submerged aquatic vegetation (SAV): Wetland plants that exist completely below the water surface.

Total Maximum Daily Load (TMDL): The maximum allowed level of pollutant loading for a water body, while still protecting its uses and maintaining compliance with water quality standards, as defined in the Clean Water Act.

Total phosphorus (TP): An estimate of the concentration of phosphorus in both organic and inorganic forms in a water sample. In freshwater environments, increased levels of this nutrient can promote the growth of algae and other plants.

Water Conservation Areas (WCAs): Diked areas of the remnant Everglades that are hydrologically controlled for flood control and water supply purposes. These are the primary targets of Everglades restoration and major components of the Everglades Protection Area.

Water quality: The physical, chemical, and biological condition of water as applied to a specific use, typically propagation of fish and wildlife, public water supply, industry, or recreation.

Water quality criteria: Constituent concentrations based on scientific data and judgments on the relationship between pollutant concentrations and environmental and human health effects.

Water Reservations: As defined by Florida law (Subsection 373.223(4), Florida Statutes), water set aside or designated for use, in a certain location, time, or quantity, as may be required for protecting fish and wildlife or public health and safety.

Water Year (WY): The period from May 1 through April 30, during which water quality and other data are collected and reported in the South Florida Environmental Report.



Acknowledgments

The South Florida Water Management District gratefully acknowledges the many professionals who have contributed to the *2011 South Florida Environmental Report*. Along with this Executive Summary, the three-volume main report was developed collaboratively by more than 200 authors and contributors from the District, the Florida Department of Environmental Protection, and other supporting agencies and organizations with expertise in the various reporting topics. The professionalism and dedication of the entire 2011 SFER team that helped prepare this large, complex document are highly recognized. A detailed list of all these contributors — including the project team, production and editorial team, and expert peer-review panel — is presented on the acknowledgments page of the main report (www.sfwmd.gov/sfer).

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EXECUTIVE SUMMARY

2011

SOUTH FLORIDA
ENVIRONMENTAL
REPORT

MARCH 1, 2011

On the Cover

The Loxahatchee River (named “river of turtles” by the Seminole Indians) winds through Martin and Palm Beach counties. A portion of the Northwest Fork of this river is one of only two national Wild and Scenic Rivers in Florida, and the state’s first river to receive this prestigious title. Notably, 2010 marked the 25th anniversary of that designation.

The diverse ecosystems of the Loxahatchee River’s watershed uniquely include canopies of majestic, centuries-old bald cypress trees. Beginning with the Atlantic Ocean’s saline waters rushing into the Jupiter Inlet to form the mouth of the river, the Loxahatchee then broadens into several rich, productive estuaries before continuing westerly to feed the vast freshwater wetlands of the Hungryland and Loxahatchee sloughs.

For more information on the Loxahatchee River, visit www.sfwmd.gov/coastal



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